

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A computer readable medium including a program having instructions, which when executed perform a radix 2 fast fourier transform on a digital series to produce signals in cyclically noncontinuous output bins that are useable in demultiplexing carrier signals, the instructions comprising:

determining the number 2^S of FFT points, the output bin index O_s , and the input signal array;

determining the butterfly index for the last stage by

$$\Psi_{s-1} = O_s \% \left(\frac{N}{2} \right)$$

determining the butterfly index for each stage other than said last stage by

$$\psi_{\ell-1} = \psi_{\ell} \% \left(\frac{N}{2^{S-\ell+1}} \right)$$

where % means modulo operation and where ℓ varies from 1 to (S-1);

using said butterfly index, calculating only those butterflies necessary for calculation of the output bins, and

providing to storage or further processing said signals in cyclically noncontinuous output bins, and

applying said signals from said cyclically noncontinuous output bins to demultiplexing at least one carrier.

2. (previously presented): The computer readable medium according to claim 1, wherein said determining the butterfly index for all later stages is performed in numerical order.

3. (previously presented): The computer readable medium according to claim 2, wherein said numerical order is ascending order.

4. (previously presented): The computer readable medium according to claim 1, further including the determination of output bins, wherein:

for stage ℓ , where ℓ varies from 1 to S, executing only that butterfly in the butterfly index set $\Psi_{\ell-1}$ of that stage;

for stage ℓ , loading the twiddle factor corresponding to the butterfly index set $\Psi_{\ell-1}$ of that stage; and

repeating (a) executing only that butterfly in the butterfly index set $\Psi_{\ell-1}$ of that stage and (b) loading the twiddle factor corresponding to the butterfly index set $\Psi_{\ell-1}$ of that stage, until the required final stage butterflies are executed and the required output bins are filled.

5. (previously presented): The computer readable medium according to claim 1, wherein using said butterfly index further comprises:

setting the butterfly index set Ψ_j where $(1 \leq j \leq S-1)$ and the selected output node index set ranges from O_s to M_s^i by

(a) for $(1 \leq j \leq S-1)$

(i) if $(k \in \Psi_j)$ or Ψ_j contains index k , then setting $m_j^k = 1$,

(ii) if $(k \notin \Psi_j)$, then setting $m_j^k = 0$,

(b) for $j = S$

(i) if $(k \in O_s)$, or O_s contains index k , then setting $m_j^k = 1$,

(ii) if $(k \notin O_s)$, or O_s , then setting $m_j^k = 1$; and

controlling of a memory pair stage j by m_j^i ($0 \leq i \leq 2^{j-1}-1$) and m_j^{i+Y} , ($Y = 2^{j-1}$).

6. (previously presented): The computer readable medium according to claim 4, wherein setting the butterfly index includes, when $0 \leq i \leq (2^{i-1}-1)$:

controlling the butterfly adder with m_j^i

controlling the butterfly subtractor with m_j^{i+Y} ; and

controlling the butterfly multiplier in accordance with the Boolean OR of m_j^i and m_j^{i+Y} .

7. (new): A method for producing signals in cyclically noncontinuous output bins that are useable in demultiplexing carrier waves, the method comprising:

determining the number 2^S of FFT points, the output bin index O_s , and the input signal array;

determining the butterfly index for the last stage by

$$\Psi_{S-1} = O_s \% \left(\frac{N}{2} \right)$$

determining the butterfly index for each stage other than said last stage by

$$\psi_{\ell-1} = \psi_{\ell} \% \left(\frac{N}{2^{S-\ell+1}} \right)$$

where where % means modulo operation and ℓ varies from 1 to (S-1);

using said butterfly index, calculating only those butterflies necessary for calculation of the output bins,

providing to storage or further processing said signals in cyclically noncontinuous output bins, and

applying said signals from said cyclically noncontinuous output bins to demultiplexing at least one carrier wave.

8. (new): The method according to claim 7, wherein said determining the butterfly index for all later stages is performed in numerical order.

9. (new): The method according to claim 8, wherein said numerical order is ascending order.

10. (new): The method according to claim 7, further including the determination of output bins, wherein:

for stage ℓ , where ℓ varies from 1 to S, executing only that butterfly in the butterfly index set $\Psi_{\ell-1}$ of that stage;

for stage ℓ , loading the twiddle factor corresponding to the butterfly index set $\Psi_{\ell-1}$ of that stage; and

repeating (a) executing only that butterfly in the butterfly index set $\Psi_{\ell-1}$ of that stage and (b) loading the twiddle factor corresponding to the butterfly index set $\Psi_{\ell-1}$ of that stage, until the required final stage butterflies are executed and the required output bins are filled.